# Technology Assessment Branch

## EPA · OSRTI · TIFSD · TAB

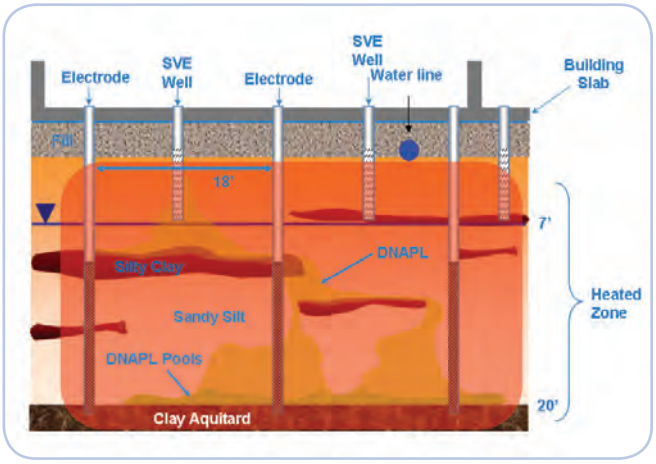
The **Technology Assessment Branch** (TAB) (within the **Technology Innovation and Field Services Division** of the **Office of Superfund Remediation & Technology Innovation**) serves federal and state site project managers, consulting professionals, and the public by providing information to improve hazardous waste site remediation. The Branch encourages the responsible use of new and innovative treatment technologies to achieve more cost effective soil and groundwater cleanup. TAB assesses and communicates state-of-the art information as it continually evolves. TAB staff members report on new developments in a clear and concise manner to meet the needs of site managers. The Branch accomplishes its objectives through benchmarking technology improvements and status, collaborating and partnering with other organizations, and providing program support and direct assistance to project managers. The Clu-In Website (*http://www.cluin.org*) serves as a repository for TAB resources and products.

## BENCHMARKING

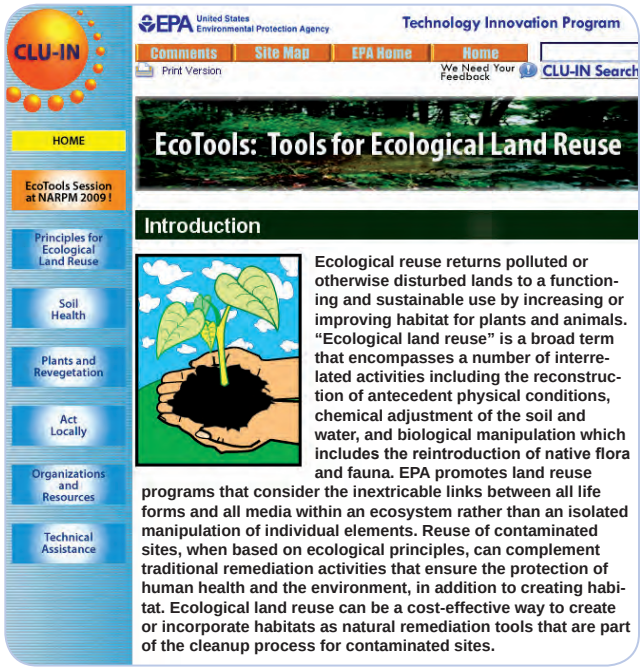
TAB primarily focuses on new developments for **treatment and restoration technologies for soil and groundwater**, including in situ processes for bioremediation of chlorinated compounds; in situ thermal, chemical oxidation and solvent extraction for nonaqueous phase liquids (DNAPLs); combinations of remedies; nanotechnologies; vegetative caps and phytoremediation; ecological restoration techniques that contribute to productive reuse of contaminated sites; and renewable energy alternatives for site cleanup. TAB personnel also maintain expertise and report on the **remediation of selected contaminant groups and media** such as DNAPLs; contaminated sediments; manufactured gas plants; persistent organic pollutants; abandoned mine lands; and selected emerging contaminants, such as 1,4 dioxane, mercury, and perchlorate. The Branch updates and reports current status information on the Technology and Contaminant Focus areas on *http://www.cluin.org*.

TAB leads a joint effort with other federal agencies to compile **cleanup case studies and reports** and make them available in a searchable format on the web (*http://www.frtr.gov*). Over 800 reports are available that provide broad assessments of new treatment technologies, document cost and performance at specific sites, evaluate new monitoring and site characterization technologies, and document efforts to optimize and improve the cost effectiveness of operating remedies.

A **new DNAPL focus area** (*http://www.cluin.org/DNAPL*), which was recently added, will improve remedial decisions by consolidating and organizing extensive information in a single location. This focus area addresses the most frequently encountered DNAPLs (chlorinated ethanes, creosote, coal tars, and heavy oils) and has over 1,000 references and over 400 separate pages.




*In Situ Thermal Cleanup of DNAPLs*




***EcoTools Homepage***

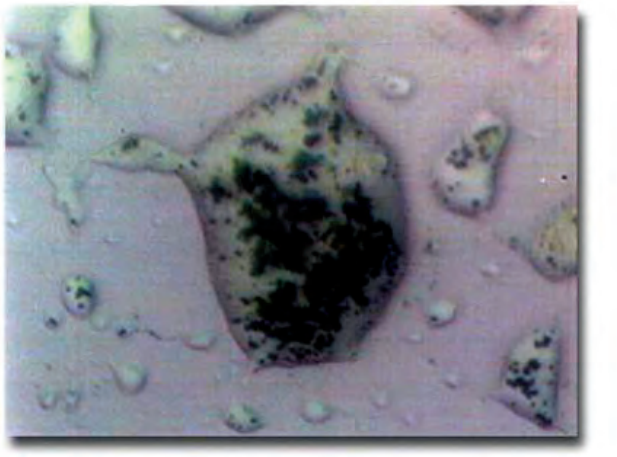
As part of an effort to foster ecological revitalization and reuse of Superfund sites, a new web resource, EcoTools, was developed to focus on **ecological revitalization of contaminated property** (*http://www.cluin.org/ecotools*). The site provides information on the principles of ecological reuse of contaminated properties; resources for support including other OSRTI fact sheets and other agency reports on the subject; and links to information on soil amendments, native and invasive plant species, and ecosystem-based restoration. The web site provides a comprehensive list of region-by-region and state-by-state federal and local resources for ecological restoration projects.

The site also contains a recently published report, *Ecological Revitalization: Turning Contaminated Properties into Community Assets* (EPA-542-R-08-003), which was developed by a cross-OSWER cleanup-program team made up of ecological revitalization experts from Superfund and other EPA offices that regulate cleanup programs for solid and hazardous waste and petroleum. The document addresses planning-level issues and highlights considerations and initiatives under different OSWER cleanup programs and case studies that provide examples of completed ecological revitalization projects at cleanup sites. The case studies are particularly noteworthy because they provide over 80 examples where revitalization was accomplished for a variety of remediation projects. A second report, *The Use of Soil Amendments for Remediation, Revitalization and Reuse* (EPA 542-R-07-013), addresses the principles of applying **soil amendments** for remediating and revegetating contaminated sites that have degraded soils. It focuses on amendments that are generally residuals (such as biosolids) from other processes, but have beneficial properties when added to soil.

TAB recently published *Nanotechnology for Site Remediation Fact Sheet* (EPA 542-F-08-009), which provides a snapshot of **nanotechnology** and its current uses in remediation. This document provides information to help project managers select and use new technologies, as well as help them understand the potential applications of this group of technologies at their sites. The fact sheet includes information on sites where nanoparticles have been

***Leadville, CO, before and after the use of soil amendments for remediation, revitalization, and reuse.***

tested for site remediation and identifies contacts, such as vendors or project managers with field experience to facilitate networking. It is available at *http://www.clu-in.org/542F08009*.



***NZVI Visable Inside a Vegetable Oil Emulsion Droplet, Photo Courtesey of Navy Facilities Engineering Command***

**Site profiles on selected technologies** are maintained on *CLU-IN On-line Remediation Databases at http://www.cluin.org/databases*. TAB maintains eight technology and contaminant-specific databases with updated and formatted information that can be searched through a universal search engine. Information is provided on pilot- and full-scale applications of innovative treatment and site characterization technologies.

The Branch manages publication of *Technology News and Trends*, a bi-monthly **newsletter** highlighting recent developments for treatment and site characterization. It is broadly distributed to the remediation community and written by federal and state project managers to inform their peers about important new developments at sites.

TAB sponsors a **national annual conference** on a subject related to innovative and treatment technologies. Recent conferences have addressed methods to improve site monitoring and characterization and the application of nanotechnology.

## COLLABORATION and PARTNERSHIPS

TAB products are developed in collaboration with a broad array of site cleanup professionals and groups who serve as state, federal, and industry partners. The Branch supports the **Federal Remediation Technologies Roundtable**, which is a cooperative effort among federal agencies with active remediation programs. Member agencies attend twice-yearly meetings to share information and discuss collaborative efforts to benefit from each other's experience. FRTR members share information on topics such as alternative energy sources. The technical presentations at the meetings are broadcast to interested agency staff through a web conference, and are archived at *http://www.frtr.gov/meetings2.htm.*

The Branch supports the **State Coalition for Remediation of Drycleaners** (*http://www.drycleancoalition.org*), a partnership with states that captures information on the performance and lessons learned from application of innovative technologies at chlorinated solvent drycleaner sites. The coalition is made up of 13 states with established drycleaner remediation programs. A *10 Year Accomplishment Report—State Coalition for the Remediation of Drycleaners* (EPA 542-R-08-004, October 2008) is a recent progress report of the accomplishments

TECHNOLOGY NEWS AND TRENDS

A newsletter about soil, sediment, and ground-water characterization and remediation technologies

Issue 42 May 2009

This issue of Technology News and Trends highlights innovative applications of soil vapor extraction (SVE) and bioventing for removal of volatile organic compounds (VOCs). SVE has accounted for approximately 25% of the in situ technologies used for source control over the past 25 years, and recent years have shown rising interest in bioventing technology.

Full-Scale SVE System Operates in Tandem with Ground Water Treatment

Since 1993, SVE has been implemented using two designs at the TP Industrial, Inc. (TPI) site in Gardena, CA, to treat soil contaminated with chlorinated solvents. The SVE system was modified in 1997 to improve emissions control efficiency by using carbon adsorption units that treat effluent from an air-stripping system for treating site ground water. By the end of 2007, SVE had removed a cumulative halogenated organic compound (HOX) mass of approximately 25,000 pounds.

The former TPI facility was used from 1964 through 1986 for solvent reprocessing, which involved storage of chemicals in aboveground and underground tanks. Investigations by the California Regional Water Quality Control Board in the early 1980s identified 1,1-dichloroethene, tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA), methylene chloride, trichloroethene (TCE), and 1,1,2-trichlorotrifluoroethane. All were found in both the saturated and unsaturated zones of two areas, with representative high concentrations reaching 1,790 mg/kg for PCE and 725 mg/kg for TCA. Site characterization indicated that the vadose zone consists of well-stratified layers of silty sand, clean sand, sandy and/or clayey silt, and silty clay. Ground water is approximately 75 feet below ground surface (bgs).

In 1986, the California Department of Toxic Substances Control (CA DTSC) began managing the site's corrective actions. Ground water treatment began in 1988 through use of an air stripping system. Site closure activities included removal of three underground tanks and offsite disposal of approximately 2,000 $yd^3$ of soil excavated from depths extending to 30 feet bgs. CA DTSC determined that additional excavation was infeasible, and in 1990 tested and selected in situ SVE as the most feasible remedial technology for removing the remaining HOX.

SVE operation began in 1993. The SVE network encompasses eight 2-inch-diameter vapor extraction wells screened between 16 and 66 feet bgs in two of the previously excavated areas. The wells are connected to a knock-out pot and a single 7.5-hp rotary blower that extracts soil gas from the well network at 100-130 scfm. Initial design of the system relied on refrigeration technology to condense and control VOC emissions.

After removing approximately 10,000 pounds of HOX, operation was suspended in April 1996 due to failure of the refrigeration system compressor and difficulties in attaining an emissions control efficiency of 90%, in accordance with South Coast Air Quality Management

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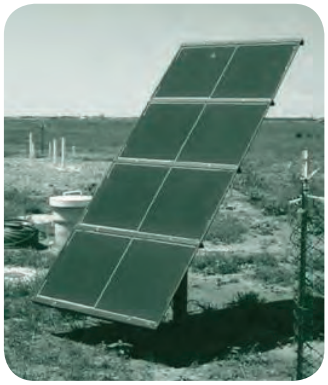
Online Resources

Soil vapor extraction and bioventing are two of 19 remediation technologies addressed in the U.S. Environmental Protection Agency (EPA) CLU-IN web forum. Visit http://www.cluin.org/remediation/ for information about SVE or bioventing applications at other sites as well as guidance from EPA, U.S. Department of Defense services, and state regulatory agencies.

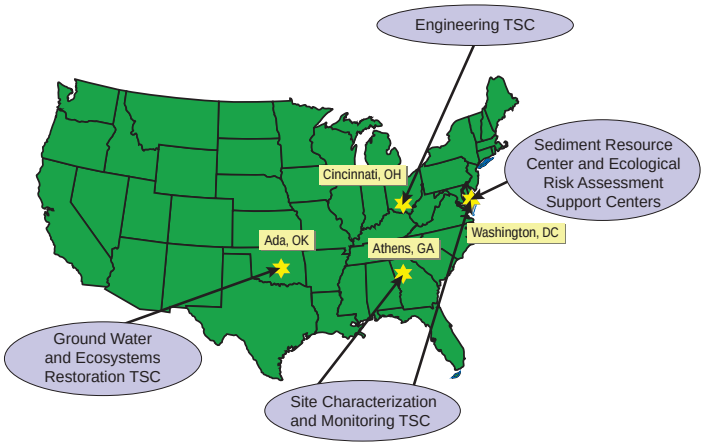
from this collaborative effort. The Coalition documents and shares technical information about actual site cleanups. Profiles for almost 150 remediation projects help site managers make better informed decisions.

TAB provides funding and management to help support the **Technical Support Project**, which is an EPA headquarters/regional/laboratory partnership to address issues concerning characterization and remediation. The project includes senior scientific and engineering staff, who participate in the Ground Water, Federal Facilities and Engineering Forums. TAB also supports the new **National Sediments Forum**, made up of regional sediments project managers, and supporting headquarters and laboratory sediments experts.



***Example of Solar Cell at Altus Air Force Base Site (OK), Documented in TNT Newsletter***

In addition, TAB works with states by participating as federal liaisons to the Board of Advisors of the **Interstate Technology & Regulatory Council** (ITRC) and technical team members. The ITRC is a state-led organization that develops information resources and training on innovative cleanup technologies and approaches.




***ORD Technical Support Centers***

## PROGRAM and TECHNICAL SUPPORT

While new information benefits all hazardous waste sites, the Branch's primary function is to **increase the cost effectiveness of Superfund remedies**. Staff members work on issues encompassing the entire Superfund process, including remedy selection, construction, post-construction, policy/guidance development (e.g., risk-sharing), and program evaluation.

The **status of Superfund technology use** is reported in the 12th Edition of *Treatment Technologies for Site Cleanup: Annual Status Report* (ASR). The report provides data on technology applications at more than 1,900 soil and groundwater projects and shows continued progress in treating waste in place and efforts to implement innovative technologies. TAB is currently compiling data on Superfund remedies selected in fiscal years 2005-8. Results are expected to be published in the fall of 2009.

Direct technical consultation and support is provided through **Technical Support Centers** (Sediment, Ecological Revitalization, and funding for ORD Laboratories) and directly by individual TAB staff.

## Staff List and Expertise

*Technology cost and performance:*
John Kingscott, Branch Chief (703) 603-7189 kingscott.john@epa.gov

*DNAPLs, manufactured gas plants, chemical oxidation, soil vapor extraction, in situ & ex situ thermal treatment :*
Jim Cummings (703) 603-7197 cummings.james@epa.gov

*Metals, natural attenuation, groundwater treatment, bioremediation, phytoremediation, solidification/stabilization:*
Linda Fiedler (703) 603-7194 fiedler.linda@epa.gov

*Site ecological revitalization & redevelopment, terrestrial carbon sequestration, persistent organic pollutants:*
Michele Mahoney (703) 603-9057 mahoney.michele@epa.gov

*Renewable energy alternatives for site cleanup, calculations of site energy use & diesel & greenhouse gas emissions :*
Penny McDaniel (703) 603-8913 mcdaniel.penelope@epa.gov

*1,4-Dioxane, mercury, mining sites, nanotechnologies:*
Marti Otto (703) 603-8853 otto.martha@epa.gov

*Drycleaners, technology databases:*
John Quander (703) 603-7198 quander.john@epa.gov

*Mailing Address:*
Technology Assessment Branch
U.S. EPA (5203P)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460